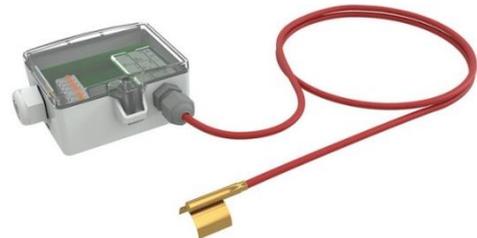# AF25+ Basic RS485 Modbus

Contact temperature sensor

Thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to technical alteration
Issue date: 06.02.2024 • A122

» APPLICATION

Contact sensor with enclosure USE-M, connection cable and brass strap used to measure the surface temperature of pipes (cold or hot water) and other contact surfaces. LCD models with RGB background light have a transparent cover. Display configuration and threshold values for color changes can be parameterized via Thermokon USEapp. With the option board relay two-point controllers or a 2-stage 2-point controller for temperature can be realized. Tightening strap/tension clamp and thermal contact fluid are available as accessories.

» TYPES AVAILABLE

Contact sensors temperature – Bus
- AF25+ Basic RS485 Modbus

» SECURITY ADVICE – CAUTION

The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Please comply with
- Local laws, health & safety regulations, technical standards and regulations
- Condition of the device at the time of installation, to ensure safe installation
- This data sheet and installation manual

» PRODUCT TESTING AND CERTIFICATION

CE

Declaration of conformity
The declaration of conformity of the products can be found on our website
https://www.thermokon.de/direct/en-gb/categories/af25plus

» NOTES ON DISPOSAL

The crossed-out wheelie bin symbol indicates that the product or removable batteries must not be disposed of with household or commercial waste. Within the EU, you are legally obliged to dispose of the product separately and appropriately in accordance with the national laws of your country. Alternatively, please contact your supplier or Thermokon Sensortechnik GmbH. Further information can be found at: www.thermokon.com

» BUILD-UP OF SELF-HEATING BY ELECTRICAL DISSIPATIVE POWER

Sensors with electronic components always have a dissipative power, which affects the temperature measurement of the ambient air. The dissipation in active temperature sensors shows a linear increase with rising operating voltage. This dissipative power has to be considered when measuring temperature. In case of a fixed operating voltage (±0,2 V) this is normally done by adding or reducing a constant offset value.

Thermokon transducers can be operated with variable operating voltages. The transducers are set at the factory with a reference operating voltage of 24 V =.

At this voltage, the expected measuring error of the output signal will be the least. Other operating voltages, can cause a measurement deviation changing power loss of the sensor electronics.

A recalibration can be carried out directly on the unit or via a software variable (app or bus).

Remark: Occurring draught leads to a better carrying-off of dissipative power at the sensor. Thus temporally limited fluctuations might occur upon temperature measurement.

» USE ENCLOSURE WITH UV AND WEATHER RESISTANCE

After some time, outdoor mounted plastics can lose their color and quality. Therefore, all USE housings are made of special white polycarbonate (PC). The light-stable colorants and additives are used to achieve optimum protection of the polymer while maintaining color stability. The titanium dioxide used is specially developed for polycarbonate and offers excellent UV protection through the reflection of the entire light spectrum including the UV component by 340 nm. This effectively counteracts the otherwise occurring photochemical polymer degradation. The colors stay full for a long time without fading. The material is also resistant to cold and frost.

» TECHNICAL DATA

Measuring values	temperature	
Network technology	RS485 Modbus, RTU or ASCII, half-duplex, baud rate 9.600, 19.200, 38.400 or 57.600, parity: non (2 stopbits), even or odd (1 stopbit), **Fail-safe biasing required**	
Power supply*	15..24 V = (±10%) (or 24 V ~ (±10%))* SELV	
Power consumption	max. 0,7 W (24 V =) | 1,8 VA (24 V ~) SELV	
Operating temperature range ** Max. permissible operating temperature*	**sensor pocket** -50..+135 °C	**enclosure** -35..+70 °C
Accuracy temperature	±0,5 K (typ. at 21 °C)	
Enclosure	enclosure USE-S, PC, pure white, with removable cable entry	
Protection	IP65 according to EN 60529	
Cable entry	Flextherm M20, for wire Ø=4,5..9 mm, removeable	
Connection electrical	removable plug-in terminal, max. 2,5 mm²	
Pocket	brass, Ø=6 mm, mounting length 35 mm, standard cable length 1000 mm, additional cable lengths on request	
Ambient condition	max. 85% rH short term condensation	
Mounting	installation possible in or across the direction of the pipe	

» CONNECTION PLAN AND CONFIGURATION
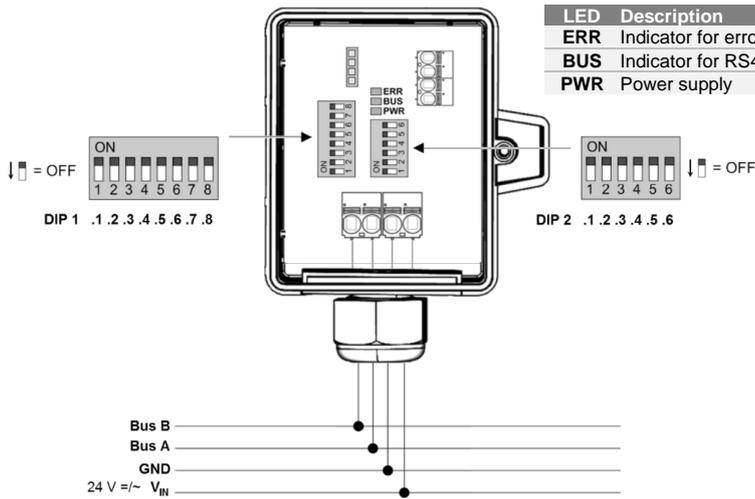
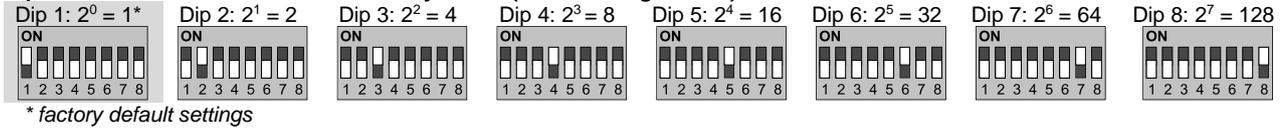| LED	Description
ERR	Indicator for error notification
BUS	Indicator for RS485 traffic
PWR	Power supply

*Power supply

When several BUS devices are supplied by one 24 V AC voltage supply, it is to be ensured that all "positive" operating voltage input terminals (+) of the field devices are connected with each other and all "negative" operating voltage input terminals (-) (=reference potential) are connected together (in-phase connection of field devices).

In case of reversed polarity at one field device, a supply voltage short-circuit would be caused by that device. The consequential short-circuit current flowing through this field my cause damage to it.
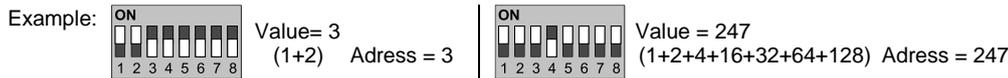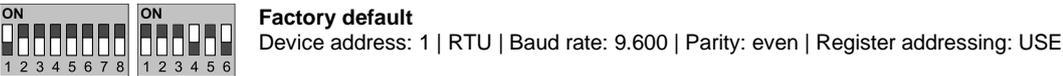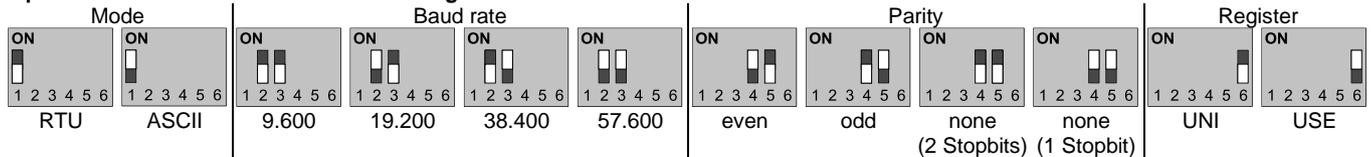
Pay attention to correct wiring.

Bus B
Bus A
GND
24 V =/~ V_{IN}

Dip switch block 1: Device Address binary coded (address range 1..247)

Dip 1: $2^0 = 1$* Dip 2: $2^1 = 2$ Dip 3: $2^2 = 4$ Dip 4: $2^3 = 8$ Dip 5: $2^4 = 16$ Dip 6: $2^5 = 32$ Dip 7: $2^6 = 64$ Dip 8: $2^7 = 128$

* factory default settings

Example: Value= 3 (1+2) Adress = 3

Value = 247 (1+2+4+16+32+64+128) Adress = 247

Dip switch block 2: Modbus interface settings

Mode		Baud rate				Parity				Register	
RTU	ASCII	9.600	19.200	38.400	57.600	even	odd	none (2 Stopbits)	none (1 Stopbit)	UNI	USE

Factory default
Device address: 1 | RTU | Baud rate: 9.600 | Parity: even | Register addressing: USE

Register compatibility to USE (Valid from firmware version 1.4, Jan. 2020)
Via dipswitch 2.6 it is possible to change between the previous register addressing of the UNI-Modbus board to a USE compatible register assignment. The function of the device does not change.

When using ASCII mode, parity must be set to EVEN or ODD. „No Parity" (no) is not available in ASCII mode.

» RS485 MODBUS REGISTER

Variant 1 (UNI-Modbus) DIP 2.6 = *OFF*

Data address	Function code	Description	Type
0_{dec} 0x0000$_{hex}$	3 (R)	Firmware z.B.: 0x1000 = Version 1.0.0.0	SIGNED 16 Bit
1_{dec} 0x0001$_{hex}$	4 (R/W)	Device Location	SIGNED 16 Bit
580_{dec} 0x244$_{hex}$	3 (R)	Temperature [1/100] °C	SIGNED 16 Bit
581_{dec} 0x245$_{hex}$	3 (R)	Temperature [1/100] °F	SIGNED 16 Bit
5_{dec} 0x0005$_{hex}$	4 (R/W)	Offset temperature [1/100] K	SIGNED 16 Bit

Variant 2 (USE-Modbus) DIP 2.6 = *ON*

Data address	Function code	Description	Type
503_{dec} | 0x01F7$_{hex}$	3 (R)	Firmware version i.e.: 0x1300 = Version 1.3.0.0	SIGNED 16 Bit
400_{dec} | 0x0190$_{hex}$	4 (R/W)	Unit system 1 = SI 2 = Imperial	SIGNED 16 Bit
0_{dec} | 0x0000$_{hex}$	3 (R)	Temperature [1/10] °C/°F	SIGNED 16 Bit
100_{dec} | 0x0100$_{hex}$	4 (R/W)	Offset temperature [1/10] K	SIGNED 16 Bit

» DIMENSIONS (MM)
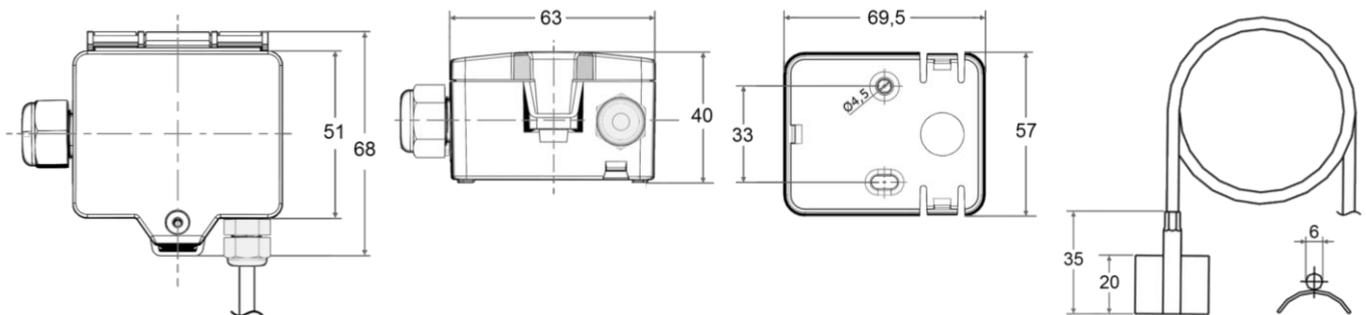
» ACCESSORIES (INCLUDED IN DELIVERY)

Mounting base enclosure USE pure white   Item No. 667722
Mounting kit universal   Item No. 698511
• Cover screw + screw cover• 2 Rawlplugs • 2 Screws (countersunk head) • 2 Screws (rounded head)

» ACCESSORIES (OPTIONAL)

RS485 Biasing Adapter   Item No. 811378
USB RS485 Modbus RTU Logger   Item No. 809917
USB Interface RS485 (incl. driver CD)   Item No. 668293

Mounting clip enclosure USE pure white   Item No. 667739
Tension clamp for pipes Ø up to 110 mm with contact fluid   Item No. 658911
Tension clamp for pipes Ø up to 250 mm with contact fluid   Item No. 648103
Tightening strap PA for pipes Ø up to 100 mm with contact fluid   Item No. 668071
Contact fluid   Item No. 102308
Cable entry M20 USE white, sealing insert 2x Ø=7 mm (10 pcs)   Item No. 641333